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A cross sectional analytical study estimating awareness of Saudi community about complications and post cementation care of porcelain veneers with dentist and patient related risk factors

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ABSTRACT

Purpose: The aim of this study is to assess the awareness and knowledge about complications, dentist /patient related risk factors and post cementation care of dental veneers among the Saudi population in Riyadh. **Materials and Methods:** A cross-sectional study using self-administered online survey was conducted on the adult population of 18-year-old and above. Data were collected through questionnaire consisting of four major areas, including demographic data, participants' general knowledge about short- and long-term complications of dental veneers, their related risk factors, and post cementation precautions. The collected data were analysed using SPSS software for Descriptive statistics and Chi square test ($p < 0.05$). **Results:** The mean total knowledge percentage of 387 participants in the study was 33% (No=141). Analysis showed gender significant difference about chipping, debonding of dental veneers and change in phonetics at cementation time ($p = 0.0331$ & $p = 0.0072$, $p = 0.1111$). College graduates and postgraduate degree holders had more knowledge regarding gum recession ($p=0.0260$) and wearing of opposing dentition ($p=0.0473$), with no significant difference ($p < 0.05$) of level of education toward veneer problems ($p = 0.8279$). Monthly income has no significant effect on community awareness of dental veneer complications ($p = 0.1023$). Veneered population was knowledgeable about patient ($p=0.0004$) and dentist ($p=0.0034$, 0.0297) risk factors, with no significance for non-veneered population ($p=0.8713$, 0.0724). Only 46% of respondents had the knowledge about post cementation precautions needed for care of dental



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veneers. *Conclusion:* The overall knowledge regarding dental veneers was low and needs improvement. Dentists were the main source of information.

Keywords: Dental veneers complications, risk factors, precautions, Saudi Community.

1. INTRODUCTION

In recent times, dentistry has witnessed an aesthetic revolution. Patients' demand and expectations of aesthetic results have increased along with the advancement of techniques, materials, and technologies used in dentistry to deliver such results. Since their positive clinical outcomes, with a 91% survival rate over 20 years (Layton & Walton, 2012), Dental veneers are considered a predictable aesthetic correction of anterior dentition. Their indications in dentistry involve covering tooth discoloration, altering contours of malformed teeth with improper positions, correction of a dental fracture, erosion or abrasion and to close interproximal spaces and diastema (RCSE, National Clinical Guidelines, 1997; Ferrari et al., 1991; Tjan et al., 1989).

A variety of materials are presented in the market that may be used to correct aesthetic/functional dental problems by veneering teeth; each material type has its sole physical, optical properties, and fabrication technique. The most common materials are resin composite and porcelain (Font et al., 2006). Porcelain laminate veneers (PLVs) are progressively used by dental practitioners due to excellent biocompatibility, stable aesthetic, and minimum destructive technique (Asaad et al., 2019). While they hold this great potential, dental veneers have, as any other restorative method, complications to consider before approving them as the confirmed treatment option (Petridis et al., 2012).

Regardless of how minimally invasive the veneer preparation is, the tooth that is restored with a porcelain veneer will never be whole again. As a result, it is important that a porcelain veneer provide the ultimate in terms of durability. Cumulative survival rate of porcelain laminate veneers was reported through previous studies for durations of 10, 14 and 20 years to be from 90% to 95% and 82.83% respectively (Alenezi et al., 2021; Arif et al., 2019; Beier et al., 2012). Different factors can influence the survival rate of these restorations, these factors include, among others, the poor quality of the veneer installed, the incorrect preparation of a tooth, the inadequate oral hygiene practice after veneer cementation, or simply choosing the wrong patient as a candidate for veneers (Petridis et al., 2012). Furthermore, the survival rate of PLVs is believed to be influenced by parafunctional activities, such as bruxism (Beier et al., 2012).

Long term complications include caries, chipping of the veneer, wearing of opposite dentition, halitosis, staining, marginal discoloration; gingival recession, plaque accumulation, and gingival inflammation were stated in previous literature (Petridis et al., 2012; Christensen, 2006). Also among reported complications were short term problems including change in color (Chen et al., 2005; Clinical Research Associates, 2006), sensitivity (Unemori et al., 2004), swelling of the gingiva, changes in phonetics, and deboning (Christensen, 2006). It is essential for dental professionals to understand the limitations of porcelain veneers and to communicate this information to their patients prior to beginning treatment.

Although the Saudi population knowledge regarding dental veneers and their side effects were tested before (Alfouzan et al., 2018; Alharbi et al., 2020), Knowledge about complications and the risk factors that may have some influence on the long-term survival of dental veneers needs specific attention to develop a conscious community who can help clinicians in decision making for optimized clinical outcomes. Thus, the objective of this study was to assess the knowledge and awareness of complications, risk factors and post cementation care of dental veneers among Saudi population in Riyadh, Kingdom of Saudi Arabia.

2. METHODS

Study design and duration

A cross-sectional analytical web-based study was conducted from April 2021 to August 2021, after obtaining Ethical Clearance (IRBC/0679/21) from King Abdullah International Medical Research Centre (KAIMRC). The target of the study was non-dental Saudi population in Riyadh, elder than 18 years. Dental Practitioners and undergraduate dental students weren't allowed for participation.

Sample size and sampling technique

A convenience sampling technique was applied using sample size calculating equation with a precision level of 5%, 46% as an estimated prevalence, and a confidence level of 95%, the minimum number of participants needed for a statistically valid result was 387 (Danial & Cross, 1995; Ngamjarus & Chongsuvivatwong, 2004).

$$n = \frac{z_{1-\frac{\alpha}{2}}^2 p(1-p)}{d^2}$$

Proportion (p) = 0.46, Error (d) = 0.0; Alpha (α) = 0.05, Z(0.975) = 1.959964

Data collection tools and study variables

Data were collected using a template supplied by Survey Monkey website. The setting of response was set to be one response to prevent multiple entries from the same participant. The study protocol was explained to all participants, and written informed consent was obtained prior to completion of the questionnaire through an explanatory letter requesting participation and ensuring anonymity. An online Self-administered close ended questionnaire was designed and created by authors based on data from previous literature (Alfouzan et al., 2018; Alharbi et al., 2020). Questionnaires were distributed among Riyadh community through social media. Study variables were Knowledge of short- and long-term complications of Porcelain veneers, Knowledge of patient and dentist related risk factors, and post cementation care measures. Socio-demographic characteristics constitute the explanatory variables in this study.

Validity and reliability

A modified standardized and pre validated Arabic version of the questionnaire was created; consisting of 29 questions organized into four sections: the first section included five questions collecting demographic data (gender, age, level of education, monthly income, and residence place) and four general questions regarding dental veneers, such as Have You Ever Had Dental Veneers? Do You Know Type of Your Veneer?, the second section comprised questions about Patient related risk factors for complications (smoking status, abnormal oral habits, and Bruxism) and Dentist related risk factors (Operator experience). Their correct answers were added to the total score regarding general dental veneers' knowledge. The Third section was for information regarding awareness of short- and long-term complications of dental veneers. The fourth section included questions concerning post cementation precautions and their sources of information. The questionnaire was reviewed by a team of professionals in aesthetic restorative dentistry at the College of Dentistry, King Saud University for Health Sciences, to verify the validity of the content. Reliability was tested using Cronbach's alpha test to ensure internal consistency of the questionnaire items based on study objectives. Alpha was found to be good ($\alpha = 0.862$) to ensure reduced bias.

Pilot study

The questionnaire was tested by distributing 20 hard copy questionnaires in Arabic among dental patients visiting university undergraduate clinics, three weeks prior to the study to evaluate the questions in terms of sentence structure, content, clarity, and ease of understanding.

Data analysis

Statistical Package for the Social Sciences (SPSS) software (versio-21, Chicago, Illinois, USA) was used to conduct statistical analysis. As the data were collected using a two-stage stratified random sampling method, complex samples procedure was designed for data analysis using sampling weights, strata and clusters. Descriptive statistics (Frequency and percent distribution) were used to present the sample characteristics. Chi-square test was performed to assess significance among variables (Fig. 1). A *p* value equal to or less than 0.05 was considered statistically significant.

3. RESULTS

The study sample included 387 persons from Riyadh, Capital of Saudi Arabia (41 males and 346 females). The percentage of female answers to the questionnaire was (80.84%) while the male percentage was (19.16%). The highest responses were from the Eastern population (52.75%) and the lowest responses were from Central and South populations (6.03% and 5.41% respectively). The majority of participants were above 35 years of age (55.47%), and of non-smokers (96.8%). The questionnaire was completed mainly by participants who had a bachelor's and post graduate degree (85.5 %); their monthly income varied, more than half (55.0%) of the participants had a monthly income less than 10,000, and 35.9% had more than 10,000SR monthly income. Table 1 shows Socio-demographic characteristics of sample considering the design effect correction. The total knowledge level for all the participants

regarding complications of dental veneers was 33%. The knowledge level was calculated depending on the percentage of correct responses on questionnaire (Fig.1).

Table 1 Sample distribution according to socio-demographic factors and veneer data of Saudi population

Predictors	Frequency	%
<i>Sociodemographic Characteristics of Participants</i>		
AGE		
18-23	96	25.68
24-29	35	9.12
30-35	37	9.73
>35	214	55.47
RESIDENCE		
South	20	5.41
North	77	20.09
Central	23	6.03
East	204	52.75
West	60	15.72
EDUCATION		
Primary	4	1
Secondary	3	0.8
Institutional	49	12.7
College/ post grad	330	85.5
INCOME		
No income	30	7.8
<10,000	212	55.0
>10,000	139	35.9
<i>Veneer Data</i>		
Have you ever had dental veneers?		
Yes	145	38
No	242	62
Do you currently have dental veneers?		
Yes	125	87
No	20	13
Do you know type of your veneer?		
Direct	15 ()	4
Indirect	144 ()	38
I don't know	224 ()	58
If you don't have veneer, are you willing to get veneer in the future?		
Yes	80	33
No	162	77

Table 1 shows veneer data distribution among subjects. A total of 145 of study respondents had veneers; 87%of them (n=125) still had it at the time of the study; 4% stated that it was direct, 38% stated indirect, but 58% did not know type of their veneers (direct or indirect). 56.3% of participants stated that they got their veneers from centre specialized in cosmetic dentistry. 37.5% got them from private hospitals, and 4.2% and 2.1% from public centre and University hospital respectively. However; 87% stated that specialist did veneers for them and only 13% stated that was a non-specialist doctor (Table 2). 85% of veneered participants stated that they do not follow up with their dentist regularly as 15% stated that they do. From 242 non veneered participants only 33% are willing to get it. Regarding patient related risk factors, 85%to 100% of veneered populations were knowledgeable regarding

smoking, parafunctional habits, and bad oral hygiene. While non-veneered population showed less knowledge with only 5.3% for smoking, 37.6% for parafunctional habits, and 68.6% for bad oral hygiene (Table 3).

Multivariate analysis (Table 2) showed no significant difference ($p < 0.05$) between male and female responses measuring their awareness that veneers might cause accumulation of food and bacteria ($p = 0.7574$) with subsequent bleeding while brushing ($p = 0.3102$), bad smell ($p = 0.0912$), marginal discoloration ($p = 0.5314$), gingival swelling ($p = 0.0833$), and gum recession ($p = 0.3115$). On the other hand, analysis showed gender significant difference where females were more knowledgeable than males; about chipping and debonding long term complications of dental veneers ($p = 0.0331$ & $p = 0.0072$ respectively). For short term complications as sensitivity (immediately after placement), change in color, there was no significant difference ($p = 0.1111$) between male and female responses; though, females were more aware ($p = 0.0001$) that change in phonetics (speech or pronunciation) is more likely to occur at time of cementation.

Even though the lower participation of younger age group (18-23y), they appeared more knowledgeable of short- and long-term complications of dental veneers ($p = 0.001$); with no significance between age groups about complications related to bleeding upon brushing ($p = 0.0875$), change in color ($p = 0.0986$) and debonding of veneers ($p = 0.1143$). College graduates and postgraduate degree holders had more knowledge regarding gum recession ($p = 0.0260$), and wearing of opposing dentition ($p = 0.0473$), with no significant difference ($p < 0.05$) of level of education toward other veneer problems ($p = 0.8279$). Monthly income has no significant effect on community awareness of dental veneer complications ($p = 0.1023$).

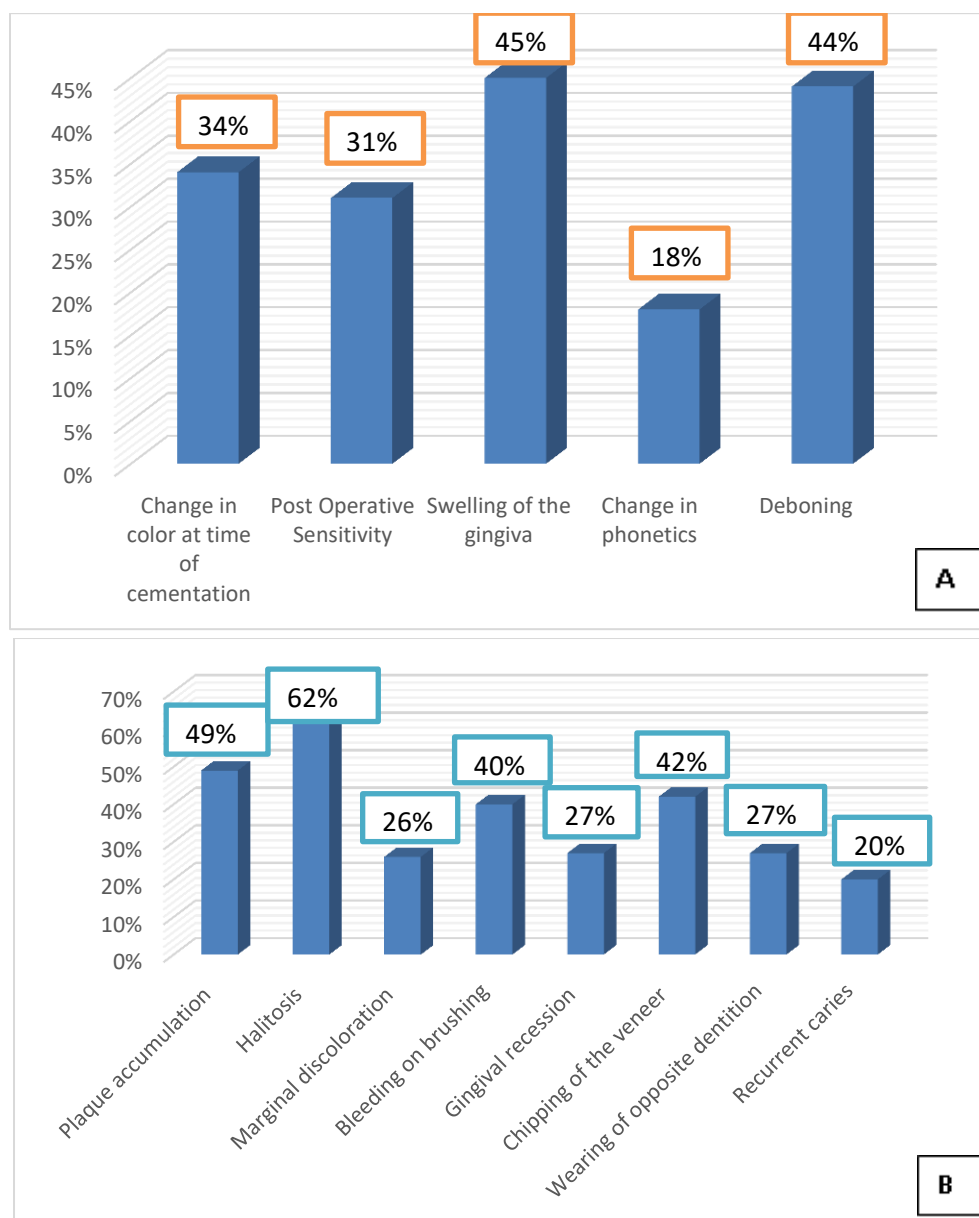


Figure 1 Participant's knowledge regarding short- [A] and long-term [B] complications of dental veneers

Table 2 Differences among participants regarding complications related risk factors (Total n=387)

Demographic Characteristics	Multivariate Analysis (p< 0.05)												
	Short - Term Porcelain Veneer Complications					Long -Term Porcelain Veneer Complications							
	Debonding	Swelling	Change in color	Sensitivity	Change in phonetics	Gum recession	Bleeding while brushing	Accumulation of food and bacteria	Bad smell	Chips or cracks	Wearing of opposite dentition	Marginal discoloration	Staining
Age	0.1143	*0.0001	0.0986	0.0610	0.3573	*0.0036	0.0875	*0.0015	*0.0001	*0.0383	*0.0022	*0.0025	*0.0010
sex	*0.0072	0.0833	0.0832	0.1111	*0.0001	0.3115	0.3102	0.7574	0.0912	*0.0331	0.1001	0.5314	0.8704
Place of residence of participant	*0.0017	*0.0003	*0.0318	*0.0045	*0.0117	0.4333	0.8704	0.2158	*0.0005	*0.0005	0.0980	0.4757	0.3279
Education	0.3059	0.1124	0.1937	0.5420	0.2258	*0.0260	0.4470	0.1334	0.1959	0.2598	*0.0473	0.8279	0.8713
Monthly income	*0.0008	*0.0133	0.1245	*0.0298	0.0541	0.0615	0.6401	0.1224	0.6755	0.1023	0.4185	*0.0105	0.1689

*Chi square test (p< 0.05)

Table 3 Differences among participants regarding complications related risk factors (Total n=387)

Knowledge of related risk factors	Responses' frequency VP+ (NVP++)			Chi square test (P value)		
	Patient risk factors			Veneered population (n=145)	Non-Veneered population(n=242)	
	Smoking	Parafunctional habits	Bad oral hygiene	0.0004*	0.8713	
Yes (correct response)	(13)123	(91)143	(166)145			
No	(53)22	(38)2	(47)0			
I don't know	(176)0	(113)0	(29)0			
	Dentist risk factors					
	Specialist		Non specialist	0.0034*	0.0724	
	Operator'experience		(137)33			
Place from where got veneers	Public center	Government hospital	Private hospital	University hospital	Center specialized in cosmetic dentistry	0.0297*
	10(0)	3(0)	46(0)	8(0)	58(0)	

VP+ Veneered Population; NVP++ Non-Veneered Complications; *Chi square test (p< 0.05)

Figure 2 shows that the number of respondents regarding the precautions that they informed of and asked to do at time of veneer placement. The precautions that were selected by majority was the use of a soft toothbrush as a unique care procedure (19%), followed by using both soft brush and dental floss (10%), and use of a prescribed mouth wash (9%). 40% of participants responded by Yes for most of care precautions. Only 6% of respondents had the knowledge about all post cementation precautions needed for care of dental veneers (soft brush, dental floss, non-abrasive toothpaste, alcohol free mouth washes). Figure 3 shows participants' distribution regarding sources of information about dental veneers' care and problems. 35% stated that their source of information about dental veneer and post cementation care was dentist. 17% stated social media, 9% stated online website and 6% for relatives and friends. Both dentists and social media was 10% as 7% was for both dentist and online website.

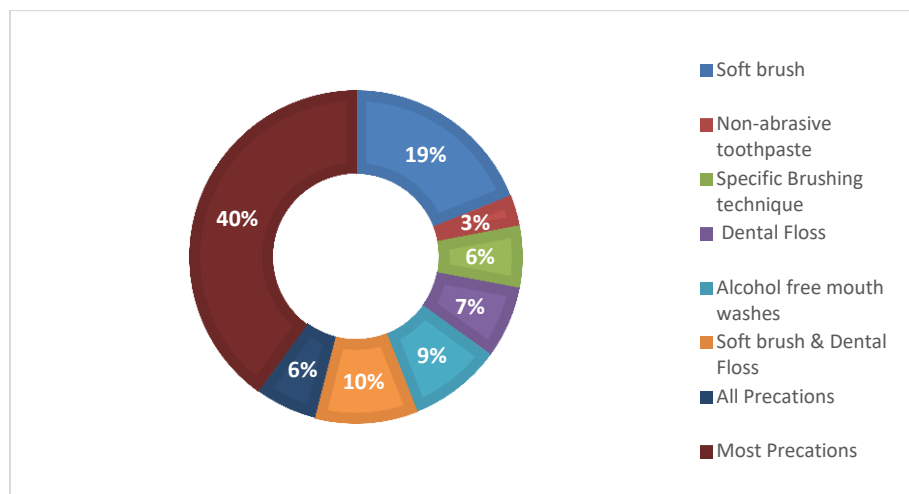


Figure 2 Participant's knowledge regarding Post cementation Care of Dental veneers

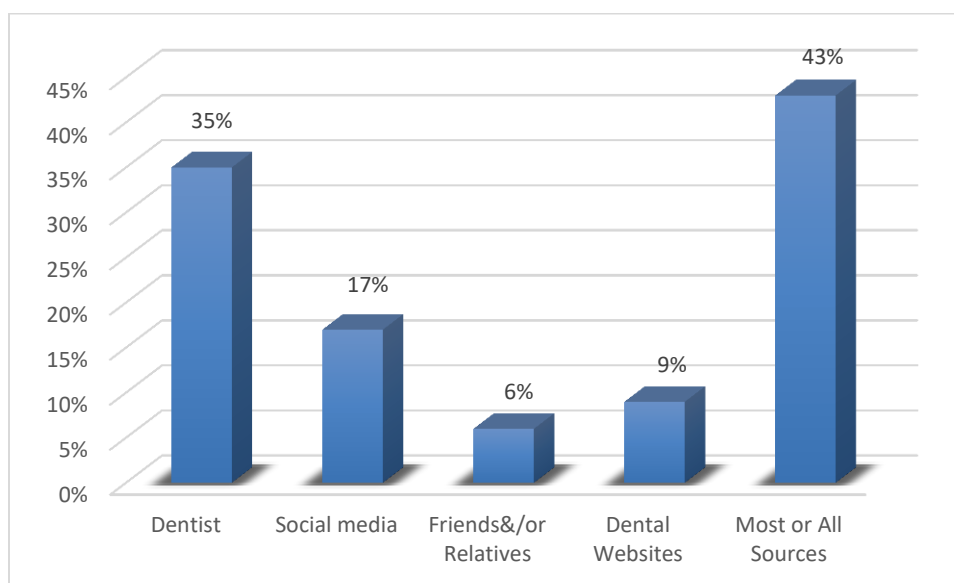


Figure 3 Participants' distribution regarding sources of information about dental veneers' care and problems.

4. DISCUSSION

Porcelain veneers are progressively increasing in popularity and demand among today's population as a conservative restoration to meet patients' aesthetic expectations. Porcelain veneers are different from most other restorations placed in dentistry insofar they are considered as elective restorations, generally placed in the absence of disease and only for the reason of esthetics. Because patients may be influential in pursuit of their esthetic demands, it is essential that the patient understands exactly what they are letting themselves in for, and the clinician has a responsibility to discuss the potential for success and the complications leading to failure of their veneers.

According to results of this study, the general knowledge of Riyadh populations regarding problems of dental veneers was considered unsatisfactory (33%), this agrees with studies conducted on same community (Alfouzan et al., 2018; Alharbi et al., 2020; Alshammery et al., 2020), and which revealed that the knowledge and awareness of Saudi population regarding dental veneers and its care were either moderate or below a satisfactory level. Females represent the majority (80.84%) of the sample population. Although it is consistent with many survey analysis studies (Layton & Walton, 2012; RCSE. National Clinical Guidelines, 1997; Clinical Research Associates, 2006), such noticed higher survey response rate for females isn't only indicative to the more esthetic care of females than males, but also points to how online surveys are highly valued by those with characteristics of connective selves, i.e. Females (Smith, 2008). Both genders had lack of knowledge regarding short and long term complications of dental veneers as 69% didn't know that it may cause post cementation sensitivity, 82% didn't know that it may cause change in phonetics, while 73% didn't know that it cause food and bacterial accumulation with subsequent gum recession (73%) and bleeding upon

brushing (60%), 66% didn't know that it may cause change in color of original teeth, and 80% didn't know that direct veneers are more prone to staining.

The level of knowledge varied according to age and most of the correct responses were from those of younger age group (18-23y). Such results were found in agreement with previous studies done by Alharbi et al., (2020) and Marino et al., (2016), who found out that patients in older age groups had lower knowledge regarding oral health than younger age groups. The current study focuses the great interest of elder group (>35-year old) about veneer problems proved by their higher participation (55.47%). When considering education level and monthly income, no significant difference in knowledge between groups was found, though the greater participation of higher education level (85.5%), and lower participation of higher monthly incomes (> 10000 SR).

Despite the reduced number of participants who had veneers (38%), and the ones who still had them at the time of survey (n=125), most of respondents (56.3%) appeared keen to get their veneers from Centers specialized in cosmetic dentistry, and to be done by specialist (87%), reflecting their interest to get lifetime restoration with as much less complications as possible. This finding was supported before by Aslan et al., (2019) who confirm the importance of placement by experienced dentists, as 10 years survival rates for lithium Disilicates laminate veneers, reported in his study, was 65.52% when placed by inexperienced clinicians. One of the findings of this study was that more than half of veneered participants (58%) lack the knowledge about the type of their veneers, which emphasizes the importance of thorough discussion and written consent before starting veneer procedure. The study also revealed a very low percentage of non-veneered population (5.3%, n=13) who had knowledge about smoking, the main causative factor of poor oral hygiene, and bruxism (37.6%) the risk factor for fractures of ceramics (Chrcanovic et al., 2020) alerting the higher possibility of non-candidate patients for dental veneers.

In the current study, very low percentage of the respondents (6%) who had the knowledge about all precautions with moderate percentage (40%) for most of oral hygiene measures needed for care of dental veneers, highlights the role of patient education before insertion of dental veneers (Nalbandian & Millar, 2009). Lack of veneer care knowledge was found in agreement with Alharbi et al., (2020) and Alshammary et al., (2020). In contrary to previous studies (Alfouzan et al., 2018; Alharbi et al., 2020; Alshammary et al., 2020), dentists (35%) were reported to be the main source of knowledge, compared to other non-medical sources (social media 17%, Websites 9%, relatives and friends 6%), which is regarded as an indication of the proper manner in which community awareness is growing, reflecting the greater role of dentists in the success of such esthetic dental procedure.

5. CONCLUSION

The present study was conducted to assess the knowledge of short- and long-term complications, risk factors and care of dental veneers among Saudis in Riyadh, Kingdom of Saudi Arabia. It was found that knowledge is inadequate, and measures have to be taken in dental care settings by dental professionals in order to improve awareness regarding dental veneers and its complications, emphasising the importance of post cementation care as a contributing factor for longer survival rate of such type of elective restorations.

Limitations

The present study was conducted as an online questionnaire-based survey based on convenience sampling, so there is a chance of sampling bias in terms of sample representation and inequitable gender and geographic (i.e. place of residence) distribution.

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Author Contributions

Study conception and design: Randa Sabry Ibrahim, Balsam Dawood Alghomlas, Razan Mohamed Aldhafiri; Data collection: Abeer Abdullah Alrumyyan, Balsam Dawood Alghomlas, Miral Zaki Alrowili, Norah Mohammed Gharawi, Saleha Khalid Alkhairy, Razan Mohamed Aldhafiri; Analysis and interpretation of results: Randa Sabry Ibrahim, Balsam Dawood Alghomlas, Norah Mohammed Gharawi, Razan Mohamed Aldhafiri, Dr. Abdul Salam Ali; Draft manuscript preparation: Randa Sabry Ibrahim, Balsam Dawood Alghomlas, Saleha Khalid Alkhairy. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are presented in the paper.

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